

Claims

1. An acidic sanitizing and/or cleaning composition capable of being diluted to form an acidic sanitizing and/or cleaning use solution, the composition comprising:

5 a) an quaternary antimicrobial system comprising
at least one C₁-C₄ hydroxyalkyl carboxylic acid or salt
thereof,
at least one C₅-C₁₈ alkyl monocarboxylic acid having the
general formula:



10 wherein R¹¹ is a straight or branched, saturated or unsaturated alkyl moiety having from about 5 to about 18, preferably from about 6 to about 12 carbon atoms; or salt thereof,

at least one dicarboxylic acid having the general formula:



wherein R is a saturated or unsaturated hydrocarbon moiety

20 having 2 carbon atoms; R' is hydrogen, hydroxyl, a substituted or unsubstituted n-alkyl or n-alkenyl moiety having from about 1 to about 12, preferably from about 6 to about 12 carbon atoms, where suitable substituents of R' comprise thiol, methane thiol, amine, methoxy and aryl substituents and n' and n" each are an integer of from 0 to 4; and R" represents hydrogen or

25 hydroxyl; or salt or anhydride thereof;

at least one acid capable of yielding a pH of about ≤ 5.0 upon dilution of the composition to a use solution,

2. The sanitizing and/or cleaning composition according to Claim 1 wherein said at least one C₁-C₄-hydroxy alkyl carboxylic acid is an α -hydroxy alkyl carboxylic acid selected from the group consisting of glycolic acid, lactic acid, hydroxy propanoic acid, dihydroxy propanoic acid, hydroxy butyric acid, 5 and mixtures thereof.

3. The sanitizing and/or cleaning composition according to Claim 1, wherein said at least one C₅-C₁₈-alkylmonocarboxylic acid (β) is selected from the group consisting of pentanoic acid, hexanoic acid, heptanoic acid, octanoic acid, nonanoic acid, decanoic acid, undecanoic acid, dodecanoic acid, 5 tridecanoic acid, tetradecanoic acid, pentadecanoic acid, hexadecanoic acid heptadecanoic acid, octadecanoic acid, neodecanoic acid, 2,2-dimethyloctanoic acid and mixtures thereof.

4. The sanitizing and/or cleaning composition according to Claim 1, wherein said dicarboxylic acid is selected from the group consisting of tartaric acid, maleic acid, fumaric acid, succinic acid, n-octyl succinic acid, n-octenyl succinic acid, n-nonyl succinic acid, n-nonenyl succinic acid, n-decyl succinic acid, 5 n-decenyl succinic acid, n-hexyl succinic acid, n-hexenyl succinic acid, diisobutetyl succinic acid, methyl heptenyl succinic acid and mixtures thereof; preferably is n-octenyl and/or n-nonenyl succinic acid(s).

5. The sanitizing and/or cleaning composition according to Claim 1, wherein said acid is an organic acid, preferably an organic acid selected from the group consisting of formic acid, acetic acid, citric acid, and alkyl sulfonic acid, preferably methyl sulfonic acid, or an inorganic acid, preferably an inorganic acid selected from the group consisting of phosphoric acid, sulfuric acid, nitric acid (preferably in combination with a small amount (about 1 wt.%) of urea to prevent NO_x formation), hydrochloric acid, sulfamic acid and mixtures thereof, more preferably, said acid (δ) is selected from the group consisting of phosphoric acid, sulfuric acid, nitric acid, methyl sulfonic acid and mixtures thereof.

6. The sanitizing and/or cleaning composition according to Claim 1, wherein the mono- and dicarboxylic acids are present in a weight ratio of between about 1 : 1 and about 1 : 20, preferably between 1 : 2 and 1 : 10.

7. The sanitizing and/or cleaning composition according to Claim 1, wherein said at least one solubilizer is a surfactant-hydrotrope selected from the group consisting of anionic surfactants, nonionic surfactants, zwitterionic surfactants and mixtures thereof.

8. The acid sanitizing and/or cleaning composition according to Claim 7, wherein the anionic surfactant is selected from the group consisting of alkyl sulfonates and alkylaryl sulfonates having about 8 to about 22, preferably 8 to 18 carbon atoms in the alkyl portion, ammonium, alkali metal or alkaline earth metal salts or mixtures thereof, preferably is sodium or potassium alkyl benzene sulfonate, sodium or potassium xylene sulfonate, sodium or potassium cumene sulfonate or sodium or potassium toluene sulfonate.

9. The sanitizing and/or cleaning composition according to Claim 7, wherein the zwitterionic surfactant is selected from the group consisting of alkylimidazolines, alkylamines and mixtures thereof.

10. The sanitizing and/or cleaning composition according to Claim 7, wherein the nonionic surfactant is selected from the group consisting of ethylene oxide adducts of C₈ to C₂₂, preferably C₈ to C₁₆, more preferably C₈ to C₁₂ alcohols, ethylene oxide/propylene oxide adducts of ethylene glycol, alkylene glycols or mixtures thereof.

11. The sanitizing and/or cleaning composition according to Claim 1, wherein said at least one diluent is selected from water and short chain alcohols having 2 to 5 carbon atoms, preferably is potable drinking water.

12. The sanitizing and/or cleaning composition according to Claim 1, wherein said C₁-C₄-hydroxyalkyl carboxylic acid is present in an amount of from about 0.25 to 15, preferably from 1 to 10, more preferably from 2 to 8, most preferably from 3 to 8 wt.%, based on the total amount of the composition.

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13. The sanitizing and/or cleaning composition according to Claim 1, wherein said C₅-C₁₈ alkylmonocarboxylic is present in an amount of from about 0.1 to 5, preferably from 0.3 to 4, most preferably from 0.5 to 2.0 wt.%, based on the total amount of the composition.

14. The sanitizing and/or cleaning composition according to Claim 1, wherein said dicarboxylic acid is present in an amount of from about 0.1 to 8, preferably from 0.5 to 6, most preferably from 1 to 4.5 wt.%, based on the total amount of the composition.

15. The sanitizing and/or cleaning composition according to Claim 1, wherein said acid is present in an amount of from about 4.0 to about 60.0, preferably from about 10 to 40 wt.%, based on the total amount of the composition.

16. The sanitizing and/or cleaning composition according to Claim 1, wherein said diluent is present in an amount of from about 10 to about 95.5, preferably from about 15 to 90 wt.%, based on the total amount of the composition.

17. The sanitizing and/or cleaning composition according to Claim 1, wherein said detergent is present in an amount of from about 5 to 30, preferably of from about 10 to 25 wt.%, based on the total weight of the composition.

18. The sanitizing and/or cleaning composition according to Claim 1, which composition is diluted with water in a ratio of from about 1 : 10 to about 1 : 500, preferably from about 1 : 30 to about 1 : 400 and more preferably

from about 1 : 50 to about 1 : 100 parts of composition to water.

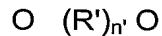
19. A low foaming acidic sanitizing and/or cleaning use solution comprising:

- a) a quaternary antimicrobial system comprising at least one C₁-C₄ hydroxy alkyl carboxylic acid or salt
- 5 thereof,
- at least one C₅-C₁₈ alkyl monocarboxylic acid having the general formula:



wherein R''' is a straight or branched, saturated or unsaturated 10 alkyl moiety having from about 5 to about 18, preferably from about 6 to about 12 carbon atoms; or salt thereof,

at least one dicarboxylic acid having the general formula:



wherein R is a saturated or unsaturated hydrocarbon moiety having 2 carbon atoms; R' is hydrogen, hydroxyl, a substituted or unsubstituted n-alkyl or n-alkenyl moiety having from about 1 to about 12, preferably from about 6 to about 12 carbon atoms, where suitable substituents of R' 20 comprise thiol, methane thiol, amine, methoxy and aryl substituents and n' and n'' each are an integer of from 0 to 4; and R'' represents hydrogen or hydroxyl; or salt or anhydride thereof;

25 at least one acid capable of yielding a pH of about ≤ 5.0 upon dilution of the composition to the use solution,

- b) at least one solubilizer;
- c) at least one diluent, preferably water; and
- d) optionally at least one detergent.

20. A low foaming acidic aqueous antimicrobial sanitizing and/or cleaning use solution wherein said composition according to Claim 1 is diluted with sufficient water to provide:

- a) from about 1 to about 5000 ppm, preferably from about 5 to about 3000, most preferably from about 10 to about 1500 ppm of the antimicrobial system;
- 5 b) from about 5 to about 10 000, preferably from about 10 to about 5000 ppm of the solubilizer, and
- c) a sufficient amount of the acid to yield a pH below about 10 5.0, preferably from 4.5 to 1.0,
- d) optionally a sufficient amount of the detergent to induce surface wetting and soil removal and
- 10 e) water as the balance of the composition.

21. A process for sanitizing and/or cleaning a hard surface, preferably a cleaning-in-place and/or sanitize-in-place process for cleaning and/or sanitizing plants in the food, dairy, beverage, brewery and soft drink industries, the process being carried out by contacting a low foaming acidic, aqueous, antimicrobial use solution according to any of claims 18 to 20 at a 5 temperature of from 0 to 80 °C, preferably from 5 to 60, °C with the hard surface to be cleaned and/or sanitized for about 30 s to about 20 min, preferably for about 1 to about 5 min, draining off the use solution with or without recycling it, and finally rinsing the hard surface with potable water.